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IS: 5318-1969

*Indian Standard*

CODE OF PRACTICE FOR  
LAYING OF FLEXIBLE PVC SHEET  
AND TILE FLOORING

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

Gr 3

*May* 1970

# *Indian Standard*

## CODE OF PRACTICE FOR LAYING OF FLEXIBLE PVC SHEET AND TILE FLOORING

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## *Indian Standard*

# CODE OF PRACTICE FOR LAYING OF FLEXIBLE PVC SHEET AND TILE FLOORING

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 23 October 1969, after the draft finalized by the Flooring and Plastering Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** PVC flooring material manufactured in different patterns to match and suit any decorating scheme is normally used for covering floors from decorative point of view in residential and office buildings and also in railway coaches. The material gives a resilient and non-porous surface which can be easily cleaned with a wet cloth as dust and grime do not penetrate the surface. Since a burning cigarette will damage the neat surface of the PVC sheet, special care should be taken to prevent burning cigarette stumps to come in contact with the PVC flooring material.

**0.3** The performance of the PVC flooring depends very much on the preparatory treatment given to the sub-floor, the selection of an appropriate adhesive for fixing, the care being taken in laying the flooring material on the sub-floor and the maintenance of the finished floor. Special care should be taken in preparing the sub-floor and making the base permanently dry so that the PVC flooring after laid will not be affected by absorption of moisture by the sub-floor. Hot sealing of joints between adjacent PVC flooring to prevent creeping of water through the joints is under study as the method is likely to increase the life of the floor.

**0.4** In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving assistance from CA37-1966 'Laying of resilient sheet and tile flooring' issued by the Standards Association of Australia.

**0.5** This standard is one of a series of Indian Standards on plastic flooring

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and wall tiles. Other standards published so far in the series are:

- IS : 3461-1966 Specification for PVC (vinyl) asbestos floor tiles
- IS : 3462-1966 Specification for flexible PVC flooring
- IS : 3463-1966 Specification for polystyrene wall tiles
- IS : 3464-1966 Methods of test for plastic flooring and wall tiles
- IS : 4112-1967 Code of practice for fixing of polystyrene wall tiles

**0.6** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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### 1. SCOPE

**1.1** This code covers details of work necessary in preparing the sub-floor surface, method of laying and fixing of PVC flooring in sheet and tile form.

### 2. TERMINOLOGY

**2.0** For the purpose of this code, the following definitions shall apply.

**2.1 Flooring**—The resilient PVC flexible sheet or tile or PVC (vinyl) asbestos tile flooring material.

**2.2 Screed Topping**—A bed of cement mortar (1 cement : 3 sand) applied to a sub-floor and brought to a defined level.

**2.3 Sub-floor**—The surface on which the flooring is to be laid.

**2.4 Underlay**—A layer of sheet material or *in situ* filling on the sub-floor or the screed topping to provide a smooth level surface to receive the flooring. Underlay may be in the form of sheet underlay or trowelled underlay.

### 3. MATERIAL

**3.1 Flooring**—The flooring shall comply with the requirements specified in IS : 3461-1966† and IS : 3462-1966‡.

**3.1.1** The thickness of the flooring shall depend on the service conditions.

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\*Rules for rounding off numerical values (*revised*).

†Specification for PVC (vinyl) asbestos floor tiles.

‡Specification for flexible PVC flooring.



### 3.2 Underlay

**3.2.1** Underlay shall be compatible with the flooring and adhesive to be used and shall be as given in **3.2.1.1** and **3.2.1.2**.

**3.2.1.1** Underlay for use on concrete sub-floor shall be the screed topping.

**3.2.1.2** Underlay for use on uneven and rough wood sub-floor shall be 3 mm thick BWR grade plywood conforming to IS : 303-1960\*.

**3.3 Adhesives** — Rubber based adhesives are suitable for fixing PVC flooring over concrete, wooden and metal sub-floors. PVA based adhesives may be used for concrete and wooden sub-floors. PVA based adhesives are not suitable for metallic surfaces and also for locations where there is constant spillage of water.

## 4. NECESSARY INFORMATION

**4.1** For efficient planning and execution of the work, the following points shall be taken into account:

- a) Area of floor;
- b) Type of sub-floor and underlay;
- c) Type and thickness of screeded bed, if any;
- d) Curing and drying time for concrete bed and screed;
- e) Damp-proofing treatment provided;
- f) Evenness of the finished floor;
- g) Type, quality and thickness of flooring;
- h) Services passing through flooring;
- j) Treatment of skirtings;
- k) Treatment of junction with adjacent flooring;
- m) Type of ventilation provided to wood sub-floor;
- n) Any dressing or polishing required; and
- p) Protection of completed flooring.

## 5. PREPARATION OF SUB-FLOORS

**5.1** The PVC flooring gives good service when laid on a firm base. Evaporation of moisture from the sub-floor cannot take place once the PVC flooring is laid. Therefore, it is important that sub-floor and underlay should be thoroughly dry before laying the PVC flooring. An irregular

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\*Specification for plywood for general purposes (*revised*).

sub-floor surface creates poor adhesion between the sub-floor and the PVC flooring; therefore, the sub-floor surface should be levelled. Recommended treatments for different sub-floors are given under 5.2 to 5.4.

## **5.2 Timber**

**5.2.1** In the case of new construction, seasoned and treated timber shall be used and shall preferably be of tongued and grooved boarding. Boards should be narrow and of equal width. Boards of very unequal width have various degrees of shrinkage. Before fixing the PVC flooring, all nail heads on the timber sub-floor shall be punched down, irregularities planed off and holes filled with suitable fillers. High spots on the timber sub-floor produce spots of rapid wear in the flooring. In case of suspended timber floor which is properly designed and is well ventilated, covering the floor with PVC flooring does not result in the growth of fungus. In the case of badly ventilated timber floor, any impervious covering like the PVC flooring reduces the already deficient ventilation and allows the moisture content of the timber to increase sufficiently to encourage fungal attack. Because of the risk of fungal attack, wood blocks and boarded floor over concrete laid on the ground shall not be covered with PVC flooring unless an efficient damp-proof membrane in the concrete below the blocks has been provided.

**5.2.2** In the case of an existing timber floor, covered with boarding when it is not possible to obtain an even surface or in cases of fungal attack, the use of diagonal boarding is recommended, after removing and replacing some of the badly affected boarding and filling in cracks with plastic wood or similar filler and after disinfecting the floor. Alternatively, plywood topping in accordance with 3.2.1.2 on the existing boarding also gives an even surface. It is important to see that floor is well ventilated.

**5.3 Concrete**— A concrete sub-floor on the ground intended for fixing PVC flooring shall contain an effective damp-proof course, shall be finished with a trowel and shall be left long enough for the concrete above the damp-proof course to dry out. The damp-proofing treatment shall be given in accordance with the method described in 5.3.1 or 5.3.2.

**5.3.1** The concrete sub-floor shall be laid in two layers. The top of the lower layer of concrete shall be painted with two coats of bitumen, conforming to IS:1580-1969\* applied at the rate of 1.5 kg/m<sup>2</sup>. The surface of the lower layer shall be finished smooth while laying the concrete so that bitumen can be applied uniformly. The bitumen shall be applied after the concrete has set and is sufficiently hard.

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\*Specification for bituminous compounds for waterproofing and caulking purposes (first revision).

**5.3.2** Bitumen felt conforming to IS : 1322-1967\* shall be sandwiched in the sub-floor concrete laid in two layers. The surface of the lower layer shall be finished smooth while laying the concrete so as to provide an even surface and thus prevent damage to the surface of the bitumen felt waterproofing membrane.

**5.3.3** Where it is expected that the dampness may find its way from the surrounding walls, the same shall also be effectively damp-proofed up to at least 150 mm above the level of the sub-floor and the damp-proof treatment below the floor shall be extended over the walls. The basement floor shall be damp-proofed according to the recommendations of IS : 1609-1966†.

**5.3.4** Before PVC flooring is laid, ample time shall be allowed for the water to dry completely from the concrete floor. It is difficult to specify the period required as it depends on weather and on the quality and thickness of the concrete, but a period of at least 4 to 8 weeks shall be allowed for drying under normal conditions. The time may be reduced if the building is well ventilated.

**5.3.5** In new work, the finish required for laying PVC flooring shall be produced with a trowel on a screed applied to the sub-floor concrete. The finish may, however, be produced on the sub-floor concrete itself by using a power-float. With old concrete, the surface shall be scrapped free of all foreign material and swept clean. The surface shall be kept wet for 24 hours by sprinkling water and then screed topping of 3 mm thickness shall be provided over the concrete. If the existing concrete surface is even, the sub-floor shall be cleaned and made free of grease, oil, paint and other deleterious materials. A separate layer of screed topping may not be necessary in this case.

**5.4 Metal Floors** — Metal floors shall be made free from rust and scale by chipping and/or vigorous wire brushing and cleaning. Metal floors shall be free from undulations due to welded joints. The welded joints which may come in contact with the PVC flooring shall be ground smooth. Paint and grease shall be removed by caustic soda washing followed by thorough rinsing with fresh water. Suitable putty compatible with the adhesive shall be used for filling metal surfaces to obtain a smooth and

## **6. LAYING AND FIXING OF PVC FLOORING**

**6.1** Prior to laying, the flooring shall be brought to the temperature of the area in which it is to be laid by stacking in a suitable manner within or near the laying area for a period of about 24 hours.

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\*Specification for bitumen felts for waterproofing and damp-proofing (*revised*). (~~Since~~ *revised*).

†Code of practice for laying damp-proof treatment using bitumen felts (*first revision*).

**6.1.1** Where air-conditioning is installed, the flooring shall not be laid on the sub-floor until the conditioning units have been in operation for at least seven days. During this period the temperature shall neither fall below 20°C nor exceed 30°C. These conditions shall be maintained during laying and for 48 hours thereafter.

**6.2** Before commencing the laying operations, the sub-floor shall be examined for evenness and dryness. The sub-floor shall then be cleaned with a dry cloth. The PVC flooring shall not be laid on a sub-floor unless the sub-floor is perfectly dry. Methods of testing for dryness are given in Appendix A.

**6.3** The layout of the PVC flooring on the sub-floor to be covered should be marked with guidelines. The PVC flooring shall be first laid for trial without using the adhesive according to the required layout.

**6.4** The adhesive shall be applied by using a notched trowel (see Fig. 1) to the sub-floor and to the back side of the PVC sheet or tile flooring. When set sufficiently for laying, the adhesive will be tacky to the touch, but will not mark the fingers. In general, the adhesive will require about half an hour for setting, it should not be left after setting for too long a period as the adhesive properties will be lost owing to dust films and other causes.

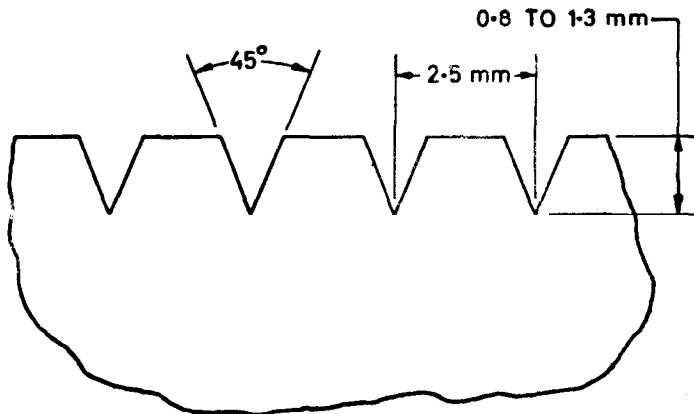


FIG. 1 DETAILS OF A TYPICAL NOTCHED TROWEL

**6.4.1** Care should be taken while laying the flooring under high humidity conditions so that condensation does not take place on the surface of the adhesive. It is preferable to avoid laying under high humidity conditions.

**6.4.2** The area of adhesive to be spread at one time on the sub-floor depends entirely upon local circumstances. In case of a small room adhesive may be spread over the entire area but relatively small areas should be treated in a larger room.

**6.5** When the adhesive is just tack free, the PVC flooring sheet shall be carefully taken and placed in position from one end onwards slowly so that the air will be completely squeezed out between the sheet and the background surface. After laying the sheet in position, it shall be pressed with suitable roller to develop proper contact with the sub-floor. The next sheet with its back side applied with the adhesive shall be laid edge to edge with the sheet already laid and fixed in exactly the same manner as the first sheet was fixed. The sheets shall be laid edge to edge so that there is minimum gap between joints.

**6.6** The alignment should be checked after laying of each row of sheet is completed. If the alignment is not perfect, the sheets may be trimmed by using a straight edge.

**6.7** The tiles shall be fixed in exactly the same manner as for the sheets. It is preferable to start laying of the tiles from the centre of the area. Care should be taken that the tiles are laid close to each other with minimum gap between joints. The tiles should always be lowered in position and pressed firmly on to the adhesive. Care should be taken not to slide them as this may result in adhesive being squeezed up between the joints. PVC tiles after laying shall be rolled with a light wooden roller weighing about 5 kg to ensure full contact with the underlay. Any undulations noticed on the PVC surface shall be rectified by removing and relaying the tiles after thorough cleaning of the underside of the affected tiles. The adhesives applied earlier in such places shall be thoroughly removed by using proper solvents and the surface shall be cleaned to remove the traces of solvents used. Work should be constantly checked against guidelines in order to ensure that all the four edges of adjacent tiles meet accurately.

**6.8** Any adhesive which may squeeze up between sheets or tiles should be wiped off immediately with a wet cloth before the adhesive hardens. If, by chance, adhesive dries up and hardens on the surface of the sheet or tile, it should be removed with a suitable solvent. A solution of one part of commercial butyleacetate and three parts of turpentine oil is a suitable solvent for the purpose.

**6.9** A minimum period of 24 hours shall be given after laying the flooring for developing proper bond of the adhesive. During this period, the flooring shall not be put to service. It is preferable to lay the PVC flooring after the completion of plastering, painting and other decorative finish works so as to avoid any accidental damage to the flooring.

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**6.10** When the flooring has been securely fixed, it shall be cleaned with a wet cloth soaked in warm soap solution (two spoons of soap in 5 litres of warm water).

### **7. PROTECTIVE EDGING**

**7.1** Where the edges of the PVC sheets or tiles are exposed, as for example, in doorways and on stair treads, it is important to provide protection against damage of the flooring material. Metallic edge strips may be used and should be securely fastened to the sub-floor to protect edges of the flooring.

### **8. MAINTENANCE**

**8.1** PVC flooring subject to normal usage may be kept clean by mopping with soap solution using a clean damp cloth. Water shall not be poured on the PVC flooring for cleaning purposes as the water may tend to seep between the joints and cause the adhesive to fail. To maintain a good wearing surface and a good appearance, the flooring may be periodically polished. When polish is applied frequently, a thick layer builds up which collects dirt and dust and is tacky to walk on.

**8.2** If the traffic is light, the floor shall be given frequent brushing; regular polishing and an application of new polish every 4 to 6 weeks. Under moderate traffic conditions the floor shall be given an occasional wash with a wet mop but no detergents shall be used so that the polish is not removed. Application of polish may be done every one to three weeks. PVC flooring should not be over-waxed; when this condition develops, the coatings should be cleared off with white spirit or paraffin and a light even coat of polish applied. When the PVC flooring has been polished, it will remain bright for a considerable period if dry mop is applied each day. It is this daily 'dry polish' that maintains the glossy surface. After exceptionally heavy traffic, PVC flooring should be swept with a hair groom, rubbed with a mop or cloth frequently rinsed in clean water, and finally rubbed dry.

## **A P P E N D I X   A**

*( Clause 6.2 )*

### **DETERMINATION OF SUB-FLOOR DRYNESS**

#### **A-1. GENERAL**

**A-1.1** Three tests for determining concrete sub-floor dryness are given in this appendix. It is intended that the first test should be carried out as

a preliminary test as it is an approximate method only, and, while adequate to separate very wet slabs from those which are dry or nearly dry, will not discriminate satisfactorily between the latter two conditions. Should this preliminary test indicate that the floor is 'dry' confirmatory tests should be made by one of the other two procedures given in **A-3** and **A-4**.

## **A-2. PRELIMINARY TEST**

**A-2.1 Materials** — The following materials are required:

- a) A sheet of glass about  $30 \times 30$  cm or rubber mat or a sheet of polyethylene (not less than 0.1 mm thick) or the PVC flooring material of about  $60 \times 60$  cm; and
- b) Putty, adhesive plasticine or other suitable mastic for sealing the edges of the sheet material.

### **A-2.2 Procedure**

**A-2.2.1** A sheet of glass, rubber or plastics material shall be placed on the concrete floor slab to be tested, and sealed thoroughly around all edges, using the mastic material.

**A-2.2.2** After a period of not less than 24 hours, the covered portion of the concrete slab shall be inspected for signs of dampness. If this area is even slightly darker in colour than the remainder of the slab, the floor shall be considered too wet. A careful inspection is required, as in conditions of good ventilation, the difference in colour may rapidly disappear after the sheet has been lifted.

**A-2.2.3** The test shall be made in several places on the slab, and repeated at regular intervals until no sign of dampness appears. The floor should then be tested at several points by either the surface hygrometer method or the electrical resistance method until satisfactory results of floor dryness are obtained before the floor should be considered sufficiently dry.

## **A-3. HYGROMETER TEST**

**A-3.1 Apparatus** — A hygrometer is so constructed that when sealed to the floor with mastic or by other suitable means, the relative humidity of a small quantity of air confined between the slab and the case of the instrument is measured.

**A-3.2 Procedure** — The case of the hygrometer shall be carefully sealed to the slab and left for a period not less than 16 hours. The relative humidity reading shall then be taken.

**A-3.3 Results**—The dryness of the concrete slab shall be considered satisfactory for conditions of laying the PVC flooring, if the relative humidity reading does not exceed 70 percent.

NOTE—The instrument shall be so placed that direct sunlight does not fall on it, as this may produce a false low reading.

#### **A-4. ELECTRICAL RESISTANCE TEST**

**A-4.1 Apparatus**—The apparatus shall comprise the following:

- a) *Resistance Meter*—one, of suitable range to enable it to be calibrated in terms of the moisture content of the slab in the range of 4 to 8 percent and having sufficient sensitivity to clearly distinguish changes of 0.5 percent.
- b) *Electrodes*—suitable to be inserted into 25 mm deep holes drilled in the concrete slab at a fixed distance apart.
- c) *A Suitable Contact Medium of Conductive Jelly*—for placing into the electrode holes.

**A-4.2 Procedure**—After drilling holes 25 mm deep in the concrete slab at a fixed distance, set the electrodes in the holes using the conductive jelly and connect to the electrical resistance meter. The moisture content of the floor shall then be read off to the nearest 0.5 percent from the resistance meter. Readings shall be taken from several widely distributed locations on the concrete slab.

**A-4.3 Results**—The concrete slab shall not be considered sufficiently dry if any one of the readings taken exceeds the following:

Vinyl asbestos flooring	6.5 percent
Other types of flooring	5.5 percent



# BUREAU OF INDIAN STANDARDS

## Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 01 31

331 13 75

Telegrams : Manaksanstha

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